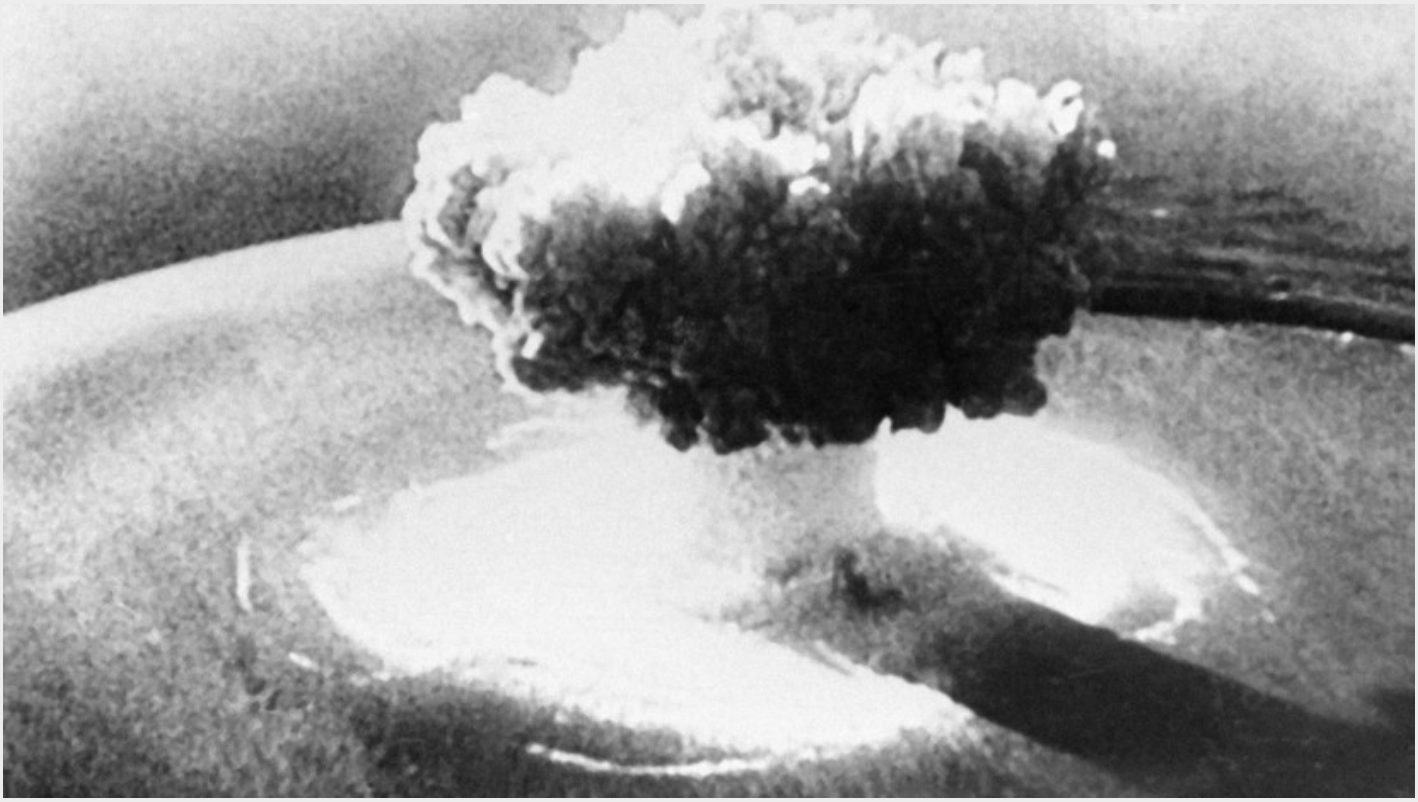
Symmetrical answer: how “product 49” established nuclear parity between the USSR and the USA

How “product 49” established nuclear parity between the USSR and the USA

March 21, 2018, 10:02 pm **Mikhail Diunov**

60 years ago, in the strictest secrecy, the first routine test of a Soviet thermonuclear charge took place at the Novaya Zemlya nuclear test site. The so-called product 49 became the basis for a new generation of nuclear weapons in the USSR - it was placed on the first Soviet intercontinental ballistic missiles, which were capable of hitting targets in the United States. About the history of the creation of the “tool of deterrence” - in the material of RT.



RIA News

Nuclear race

The decade and a half from the end of World War II to the early 1960s was a period of hard work for the USSR. Moscow had an ambitious goal - to catch up with the United States in the field of nuclear weapons. At that time, the dominant military-political position of the United States, which possessed atomic bomb technology, was beyond doubt: possible opponents of Washington, which came close to creating thermonuclear weapons, could not oppose anything to it.

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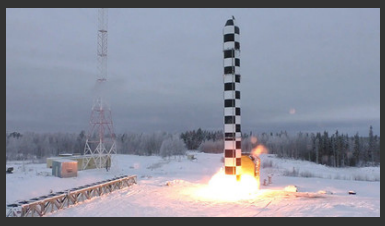

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All Soviet science and industry worked to create new weapons. The result was not long in coming: already in August 1949, the first Soviet atomic bomb was successfully tested. Of course, there were few atomic charges in the USSR's arsenal, but it could still be said that in the 1950s the Soviet army had the opportunity to adequately respond to the atomic threat.

However, just a few years later it became clear: the atomic bomb is just one of many types of superweapons. The development of thermonuclear weapons was already in full swing, and all military analysts believed that the United States was significantly ahead of its competitors here. Already in 1951, the Americans invented the “Teller-Ulam scheme” - it is still used in thermonuclear weapons. The United States did not share its unique technologies with anyone, even with its allies, the British, so the USSR had to go through the entire research path on its own.

“The thermonuclear project was originally Sakharov’s idea. Subsequently, many wonderful scientists joined him, among whom Trutnev and Babaev should be noted. And if Sakharov was a theorist, then Trutnev was a practitioner who was directly involved in the technical side of “Project 49,” military historian Yuri Knutov said in an interview with RT.

Soviet "sloyka"

Domestic technologies were fundamentally different from those overseas. Nuclear physicists Andrei Sakharov and Vitaly Ginzburg in 1949 proposed using a scheme they called “puff”: an atomic charge was surrounded by several layers of heavy and light elements. The Americans used an atomic charge to compress thermonuclear fuel, and stimulated the combustion reaction using a special “spark plug”.

“Sloika” turned out to be a completely workable scheme and made it possible to test the first Soviet thermonuclear device already in 1953 - just a few months after the United States. The great advantage of the Sakharov-Ginsburg project was its compactness compared to the American prototype, but this also put an end to the prospects of the “puff” - it was impossible to increase the charge power in this scheme.

Soviet and Russian physicist Yuri Trutnev / RIA News / © Vladimir Rodionov

In 1954, Yuri Trutnev and Yuri Babaev joined the team of KB-11 physicists working on thermonuclear weapons. They developed a new concept for using the energy of an atomic explosion to compress lithium deuteride before synthesis, essentially repeating the Teller-Ulam scheme. Already on November 22, 1955, the RDS-37 device, created by Sakharov and Zeldovich using the developments of Trutnev and Babaev, was successfully tested.

Compact and powerful

In an interview with the magazine “Atomic Strategy” in 2005, Yuri Trutnev said that in the early stages he worked on the issues of energy release of nuclear charges and the release of radiation energy from them.

“I had thoughts about using this energy to compress the secondary module. To form the direction of energy transfer, according to Sakharov’s proposal, the primary and secondary modules were enclosed in a single shell. In the course of this work, I was able to propose a method for concentrating the energy of X-ray radiation in material pressure, which made it possible to effectively carry out radiation implosion,” recalls Trutnev.

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Next, Trutnev and Babaev began work on the new “product 49”. After all, the RDS-37 product, developed by Sakharov, was a full-fledged thermonuclear device - it turned out to be too bulky, like the early American projects according to the Teller-Ulam scheme. And for use in bombs, and even more so in missiles, a more compact system was required.

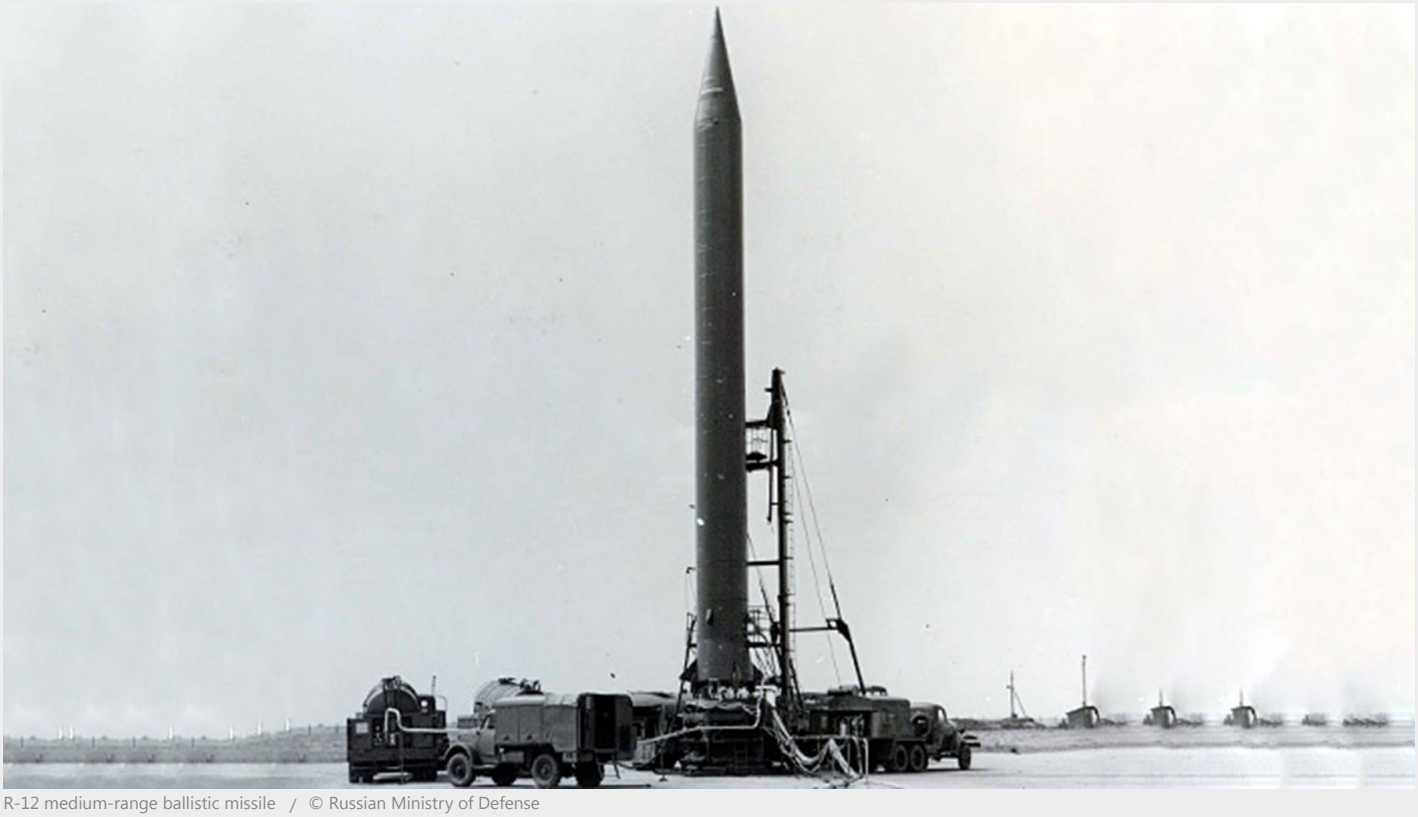
By this time, Sergei Korolev had developed the R-7, an intercontinental two-stage ballistic missile weighing 280 tons using liquid fuel. The R-7 could carry a charge weighing 5.4 tons, but its range of 8 thousand km was clearly not enough.

With such characteristics, the R-7 could only fly to the East Coast of the United States and exclusively from combat launch positions located in the circumpolar regions of the USSR.

It was possible to increase the range only by reducing the weight of the charge. Therefore, in 1958, the creation of a modification of the R-7A began with a range of up to 12 thousand km, but a charge of no more than 3 tons.

"Project 49" was originally planned as a smaller device, but with a higher specific energy release. Therefore, it was precisely this that was intended for the new rocket. By January 1958, Project 49 was ready, and the prototype was successfully tested in February. Now it was necessary to prepare the “forty-ninth” with a standard unit and test its operation. It was he who was blown up on March 21 on Novaya Zemlya.

“In 1958, together with Babaev, I managed to develop four thermonuclear charges, which underwent field testing in seven full-scale tests, and all of them were successful. This work was practically completed within eight months of 1958. All of these charges used a new circuit, first introduced in Product 49. Their energy release ranged from 0.3 to 2.8 Mt,” Atomic Strategy quotes Trutnev as saying.



R-12 medium-range ballistic missile / © Russian Ministry of Defense

The explosion power of “product 49” was 650 kilotons; the competing “product 44” designed by Sakharov and Zeldovich turned out to be less effective. It was decided to use the project of Trutnev and Babaev for military needs.

"Tool of Nuclear Deterrence"

On March 4, 1959, “product 49” became part of the nuclear warhead of the R-12 medium-range strategic missile, and on June 19, 1959, it became part of the sea-based complex of the P-5 cruise missile. In April 1959, the developers of the “forty-ninth” received the Lenin Prize.

The R-12 became the first Soviet ICBM - a weapon that unpleasantly surprised the United States , where they believed that the Soviet Union would not have the opportunity to reach America. Missiles with a warhead based on the “product 49” stationed in Cuba became one of the powerful arguments of the Soviet side during the Cuban Missile Crisis .

> **“Thanks to the experiments of the 1950s, we were able to create an effective tool for US nuclear deterrence,” Knutov emphasized.**

Tests of the Tsar Bomba (1961) / © Frame: YouTube video

After the creation of “product 49,” the development of thermonuclear weapons in the USSR continued. On October 30, 1961, the USSR tested the most powerful weapon in history - the Tsar Bomba with a capacity of 58 megatons, which in the West was nicknamed "Kuzka's Mother".

> **“These tests proved the ability of the Soviet economy to create weapons, which the United States then considered the pinnacle of technology ,” Knutov concluded.**

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